Kathleen Fuller

Access DB# 19566

SEARCH REQUEST FORM

Scientific and Technical Information Center

Requester's Full Name: Laura Weir Examiner #: 71784 Date: 1-3-06
Art Unit: 1754 Phone Number 30 2-7244 Serial Number: 09/970,952
Mail Box and Bldg/Room Location: 6A03 Results Format Preferred (circle): PAPER DISK E-MAIL

If more than one search is submitted, please prioritize searches in order of need.

****

Please provide a detailed statement of the search topic, and describe as specifically as possible the subject matter to be searched. Include the elected species or structures, keywords, synonyms, acronyms, and registry numbers, and combine with the concept or utility of the invention. Define any terms that may have a special meaning. Give examples or relevant citations, authors, etc, if known. Please attach a copy of the cover sheet, pertinent claims, and abstract.

SCIENTIFIC REFERENCE BR
Sci & Tech Inf - Ctr
JAN 05 RECD
Pat. & T.M. Office

Title of Invention: _____

Inventors (please provide full names): See first page

Earliest Priority Filing Date: _____

For Sequence Searches Only Please include all pertinent information (parent, child, divisional, or issued patent numbers) along with the appropriate serial number.*

II Can you search for an electrolyte for a battery comprising a ~~electrolyte~~ first solvent comprising methanol or hexamethyl phosphoramide or ethanol or isopropanol and a second solvent having a viscosity less than or = 1.3 cP. (Can see claim 2)

also c129 (Sulfolane) cl 2

II If possible: An electrolyte comprising a first solvent having dielectric constant greater than or equal 20 and a second solvent having viscosity less than or = 1.3 cP. (toluene, n-propyl acetate, also see cl 30) Thanks, Laura

****

STAFF USE ONLY

Searcher: K. Fuller
Searcher Phone #: _____
Searcher Location: _____
Date Searcher Picked Up: _____
Date Completed: 1/6/06
Searcher Prep & Review Time: 40
Clerical Prep Time: _____
Online Time: 60

Type of Search

NA Sequence (#) _____
AA Sequence (#) _____
Structure (#) 20
Bibliographic _____
Litigation _____
Fulltext _____
Patent Family _____
Other _____

Vendors and cost where applicable

STN ✓
Dialog _____
Questel/Orbit _____
Dr.Link _____
Lexis/Nexis _____
Sequence Systems _____
WWW/Internet _____
Other (specify) _____

PTO-1590 (8-01)

STIC Search Report
EIC 1700

STIC Database Tracking Number: 175661

TO: Laura Weiner
Location: REM 6C83
Art Unit : 1745
January 6, 2006

Case Serial Number: 09/910952

From: Kathleen Fuller
Location: EIC 1700
REMSEN 4B28
Phone: 571/272-2505
Kathleen.Fuller@uspto.gov

Search Notes

I searched using the solvent 1 and solvent 2 of the claims and also generically for solvent 1 with any other solvent. The only good answers are to the applicants..

STIC Search Results Feedback Form

USPTO

EIC17000

Questions about the scope or the results of the search? Contact *the EIC searcher or contact:*

Kathleen Fuller, EIC 1700 Team Leader
571/272-2505 REMSEN 4B28

Voluntary Results Feedback Form

- *I am an examiner in Workgroup:* [ ] *Example: 1713*
- *Relevant prior art found, search results used as follows:*
  - ☐ 102 rejection
  - ☐ 103 rejection
  - ☐ Cited as being of interest.
  - ☐ Helped examiner better understand the invention.
  - ☐ Helped examiner better understand the state of the art in their technology.

  Types of relevant prior art found:
  - ☐ Foreign Patent(s)
  - ☐ Non-Patent Literature
    (journal articles, conference proceedings, new product announcements etc.)

- *Relevant prior art **not found**:*
  - ☐ Results verified the lack of relevant prior art (helped determine patentability).
  - ☐ Results were not useful in determining patentability or understanding the invention.

Comments:

7-2401

7-2500

=> file reg
FILE 'REGISTRY' ENTERED AT 12:17:34 ON 06 JAN 2006
USE IS SUBJECT TO THE TERMS OF YOUR STN CUSTOMER AGREEMENT.
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Property values tagged with IC are from the ZIC/VINITI data file provided by InfoChem.

STRUCTURE FILE UPDATES: 4 JAN 2006 HIGHEST RN 871209-00-6
DICTIONARY FILE UPDATES: 4 JAN 2006 HIGHEST RN 871209-00-6

New CAS Information Use Policies, enter HELP USAGETERMS for details.

TSCA INFORMATION NOW CURRENT THROUGH JULY 14, 2005

Please note that search-term pricing does apply when conducting SmartSELECT searches.

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* *
* The CA roles and document type information have been removed from *
* the IDE default display format and the ED field has been added, *
* effective March 20, 2005. A new display format, IDERL, is now *
* available and contains the CA role and document type information. *
* *
****

Structure search iteration limits have been increased. See HELP SLIMITS for details.

REGISTRY includes numerically searchable data for experimental and predicted properties as well as tags indicating availability of experimental property data in the original document. For information on property searching in REGISTRY, refer to:

http://www.cas.org/ONLINE/UG/regprops.html

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FILE 'HCAPLUS' ENTERED AT 12:17:38 ON 06 JAN 2006
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FILE COVERS 1907 - 6 Jan 2006 VOL 144 ISS 2
FILE LAST UPDATED: 4 Jan 2006 (20060104/ED)

New CAS Information Use Policies, enter HELP USAGETERMS for details.

This file contains CAS Registry Numbers for easy and accurate substance identification.

=> d que

L28 47 SEA FILE=REGISTRY ABB=ON (105-37-3/BI OR 105-58-8/BI OR 107-31-3/BI OR 108-32-7/BI OR 109-60-4/BI OR 109-99-9/BI OR 110-71-4/BI OR 110-82-7/BI OR 110-86-1/BI OR 111-96-6/BI OR 123-91-1/BI OR 126-33-0/BI OR 141-78-6/BI OR 14283-07-9/BI OR 16508-95-5/BI OR 21324-40-3/BI OR 25496-08-6/BI OR 29935-35-1/BI OR 33454-82-9/BI OR 3741-38-6/BI OR 420-12-2/BI OR 462-06-6/BI OR 554-12-1/BI OR 60-29-7/BI OR 616-38-6/BI OR 623-53-0/BI OR 64-17-5/BI OR 646-06-0/BI OR 67-56-1/BI OR 67-63-0/BI OR 67-68-5/BI OR 68-12-2/BI OR 680-31-9/BI OR 71-43-2/BI OR 74432-42-1/BI OR 75-05-8/BI OR 7704-34-9/BI OR 7791-03-9/BI OR 78-93-3/BI OR 79-20-9/BI OR 822-38-8/BI OR 872-36-6/BI OR 90076-65-6/BI OR 930-35-8/BI OR 96-47-9/BI OR 96-48-0/BI OR 96-49-1/BI)
L29 1 SEA FILE=REGISTRY ABB=ON L28 AND PHOSPHORAMID?
L30 9 SEA FILE=REGISTRY ABB=ON ETHYLENE CARBONATE/CN OR PROPYLENE CARBONATE/CN OR DIMETHYL SULFOXIDE/CN OR SULFOLANE/CN OR BUTYROLACTONE/CN OR ACETONITRILE/CN OR DIMETHYL FORAMIDE/CN OR METHANOL/CN OR ETHANOL/CN OR ISOPROPANOL/CN
L31 10 SEA FILE=REGISTRY ABB=ON L30 OR DIMETHYL FORMAMIDE/CN OR L29
L35 1 SEA FILE=REGISTRY ABB=ON "FORMAMIDE, N,N-DIMETHYL-"/CN
L36 11 SEA FILE=REGISTRY ABB=ON L31 OR L35 — 1st solvents
L37 36 SEA FILE=REGISTRY ABB=ON L28 NOT L36
L38 30 SEA FILE=REGISTRY ABB=ON L37 NOT 1-2/LI
L39 5 SEA FILE=REGISTRY ABB=ON L38 AND 1-10/S
L40 25 SEA FILE=REGISTRY ABB=ON L38 NOT L39
L41 24 SEA FILE=REGISTRY ABB=ON L40 NOT LITHIUM
L44 25 SEA FILE=REGISTRY ABB=ON L41 OR TOLUENE/CN 2nd solvents
L45 384930 SEA FILE=HCAPLUS ABB=ON L36
L46 69805 SEA FILE=HCAPLUS ABB=ON L45 AND L44
L47 5870 SEA FILE=HCAPLUS ABB=ON L46 AND ELECTROLYT?
L49 53 SEA FILE=HCAPLUS ABB=ON L47 AND (LI OR LITHIUM)(2A)(S OR SULFUR OR SULPHUR)
L50 5 SEA FILE=HCAPLUS ABB=ON L47 AND (LI(W)S OR LIS)
L51 53 SEA FILE=HCAPLUS ABB=ON L49 OR L50
L52 51 SEA FILE=HCAPLUS ABB=ON L51 AND BATTER?
L53 2 SEA FILE=HCAPLUS ABB=ON L52 AND DIELE?
L54 2 SEA FILE=HCAPLUS ABB=ON L52 AND VISCOS?
L57 3 SEA FILE=HCAPLUS ABB=ON L52 AND SOLVENT#(2A)(FIRST OR SECOND OR 2ND OR 1ST OR TWO OR 2 OR COMPONENT?)
L58 993 SEA FILE=HCAPLUS ABB=ON BATTER? AND ((LI OR LITHIUM)(2A)(S OR SULFUR OR SULPHUR) OR LIS OR LI(W)S)
L59 10 SEA FILE=HCAPLUS ABB=ON L58 AND SOLVENT#(2A)(FIRST OR SECOND OR 2ND OR 1ST OR TWO OR 2 OR COMPONENT?)
L60 2 SEA FILE=HCAPLUS ABB=ON L58 AND SOLVENT#(3A)(DIELEC? OR VISCOS?)
L61 116 SEA FILE=HCAPLUS ABB=ON L45 AND L58
L63 92 SEA FILE=HCAPLUS ABB=ON L61 AND ELECTROLYT?
L64 52 SEA FILE=HCAPLUS ABB=ON L63 AND SOLVENT#
L65 8997 SEA FILE=HCAPLUS ABB=ON L45(L)ELECTROLYT?
L66 68 SEA FILE=HCAPLUS ABB=ON L58 AND L65
L67 38 SEA FILE=HCAPLUS ABB=ON L64 AND L66
L68 35 SEA FILE=HCAPLUS ABB=ON L67 AND ELECTROCHEMICAL/SC
L69 11 SEA FILE=HCAPLUS ABB=ON L68 AND SOLVENTS
L70 21 SEA FILE=HCAPLUS ABB=ON L53 OR L54 OR L57 OR L59 OR L60 OR L69

=> d l70 bib abs ind hitstr 1-21

L70 ANSWER 1 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2005:1239360 HCAPLUS
DN 144:8990
TI Polymer **electrolyte** secondary lithium **batteries** with long cycle life and good stability at high temperature
IN Wada, Yoshihiko; Miura, Katsuhito; Matsui, Shohei; Tabuchi, Masato
PA Daiso Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 15 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2005327566	A2	20051124	JP 2004-143916	20040513
PRAI	JP 2004-143916		20040513		

AB The **batteries** have crosslinked polymer **electrolyte** compns. consisting of (a) multi-component copolymer polyethers with Mw 104-107, (b) aprotic organic **solvents**, (c) low-mol.-weight S compds. and/or N compds. as additives, and (d) Li salts as **electrolytes.** In the **batteries**, side reactions between electrodes and **electrolytes** are prevented by the additives c.
IC ICM H01M010-40
ICS C08G065-321; C08K003-00; C08K005-00; C08L071-00; H01M006-18
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST polymer **electrolyte** lithium **battery** thermally stable; polyoxyalkylene lithium complex **battery electrolyte** sulfur nitrogen; secondary **battery** polymer **electrolyte** sulfite oxazole
IT Polyoxyalkylenes, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(acrylic, lithium complexes, **electrolytes**; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)
IT Polyoxyalkylenes, uses
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(lithium complexes, **electrolytes**; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)
IT Secondary **batteries**
(lithium; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)
IT Sulfonic acids, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(salts; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)
IT Lactones
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(sultones; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in

polymer **electrolytes**)

IT **Battery electrolytes**
Polymer **electrolytes**
(thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

IT Sulfates, uses
Sulfites
Sulfones
Sulfoxides
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

IT 815574-41-5DP, lithium complexes 815574-42-6DP, lithium complexes
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(crosslinked, **electrolytes**; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

IT **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate **108-32-7**, Propylene carbonate
RL: DEV (Device component use); USES (Uses)
(**electrolyte solvents**; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

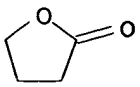
IT 14283-07-9, Lithium tetrafluoroborate 132843-44-8, Lithium bis(perfluoroethylsulfonyl)imide
RL: DEV (Device component use); USES (Uses)
(**electrolytes** containing polyoxyalkylenes; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

IT 7439-93-2DP, Lithium, complexes with glycidyl (meth)acrylate-ethylene oxide copolymers 26282-59-7DP, lithium complexes
RL: DEV (Device component use); IMF (Industrial manufacture); PREP (Preparation); USES (Uses)
(**electrolytes**; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

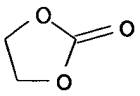
IT 120-72-9D, Indole, derivs. 288-14-2D, Isoxazole, derivs. 288-32-4D, Imidazole, derivs. 288-42-6, Oxazole 289-80-5D, Pyridazine, derivs. 289-95-2D, Pyrimidine, derivs. 290-37-9D, Pyrazine, derivs. 352-93-2, Diethyl sulfide 597-35-3, Diethyl sulfone 617-92-5, 1-Ethylpyrrole 1600-44-8, Tetramethylene sulfoxide 1633-83-6, 1,4-Butanesultone 3741-38-6, Glycol sulfite 7189-69-7, 1,1'-Sulfonyldiimidazole 12654-97-6D, Triazine, derivs. 74124-79-1, N,N'-Disuccinimidyl carbonate
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

IT **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate **108-32-7**, Propylene carbonate
RL: DEV (Device component use); USES (Uses)
(**electrolyte solvents**; thermally stable secondary **lithium batteries** containing **sulfur** and/or nitrogen compds. in polymer **electrolytes**)

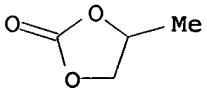
RN 96-48-0 HCAPLUS
CN 2(3H)-Furanone, dihydro- (8CI, 9CI) (CA INDEX NAME)



RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



RN 108-32-7 HCAPLUS
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



L70 ANSWER 2 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:938568 HCAPLUS
DN 142:117506
TI The effect of **solvent component** on the discharge performance of **Lithium-sulfur** cell containing various organic electrolytes
AU Kim, Seok; Jung, Yongju; Lim, Hong S.
CS Corporate R&D Center, Samsung SDI Co. Ltd., Gyeonggi-Do, 449-902, S. Korea
SO Electrochimica Acta (2004), 50(2-3), 889-892
CODEN: ELCAAV; ISSN: 0013-4686
PB Elsevier B.V.
DT Journal
LA English
AB The effect of the **solvent component** on the discharge performance of **lithium-sulfur** (**Li/S**) cell and the optimal composition of ternary electrolyte for the improved discharge performance of the cell were studied. The capacity value and capacity stability with cycle are dependent on the nature of solvent as well as the composition of mixed solvent. The change trend of discharge performance as a function of content of each **solvent component** is studied. Capacity value increases as the 1,3-dioxolane (DOX) content decreases. Average discharge voltage shows larger value when the 1,2-dimethoxy ethane (DME) content is small. Finally, the authors have obtained the optimal solvent composition by using a statistical method.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 76
ST solvent effect electrochem discharge **lithium sulfur** secondary **battery**; org electrolyte secondary **battery** ether galvanic cycling statistical optimization
IT Carbon black, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(Ketchen black, in cathode active phase; effect of **solvent**

component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Electric current-potential relationship
(discharge curves of assembled batteries; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Electric potential
(discharging, solvent effects on; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Battery electrolytes
Solvent effect
(effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Secondary batteries
(lithium; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Electric capacitance
(of assembled batteries; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT Experimental design
(of electrolyte composition, optimization for discharge behavior; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT 7439-93-2, Lithium, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(anode; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT 25322-68-3, Polyethylene oxide
RL: DEV (Device component use); USES (Uses)
(binder in cathode active phase; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT 7429-90-5, Aluminum, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(current collector; effect of solvent component on discharge performance of Lithium-sulfur cell containing various organic electrolytes and optimization thereof)

IT 110-71-4, 1,2-Dimethoxy ethane 111-96-6, Diglyme 646-06-0, 1,3-Dioxolane 90076-65-6, Lithium bis(trifluoromethanesulfonyl)imide
RL: DEV (Device component use); USES (Uses)
(effect of solvent component on discharge performance of Lithium-sulfur cell containing various

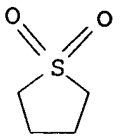
organic electrolytes and optimization thereof)
IT 7704-34-9, Sulfur, uses
RL: DEV (Device component use); USES (Uses)
(in cathode active phase; effect of **solvent component** on discharge performance of **Lithium-sulfur** cell containing various organic electrolytes and optimization thereof)
RE.CNT 6 THERE ARE 6 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L70 ANSWER 3 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:493237 HCAPLUS
DN 141:40710
TI Organic **electrolyte** solution for secondary **lithium sulfur battery** and the **battery** using the solution
IN Kim, Ju-yup; Lee, Suk-su; Yoo, Yoon-kyun; Cho, Myung-dong
PA Samsung Sdi Co., Ltd., S. Korea
SO Jpn. Kokai Tokkyo Koho, 14 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2004172126	A2	20040617	JP 2003-387193	20031117
	US 2004157132	A1	20040812	US 2003-694815	20031029
	CN 1501543	A	20040602	CN 2003-10103670	20031111
PRAI	KR 2002-71395	A	20021116		

AB The **electrolyte** solution comprises a Li salt and an organic **solvent** mixture; where the **solvent** mixture contains a compound of the formula R1(CH2)3R2 [R1 and R2 = halo, OH, (substituted) C1-20 alkyl, (substituted) C1-20 alkoxy, (substituted) C6-30 allyl; (substituted) C6-30 allyl alkyl; (substituted) C6-30 allyloxy, (substituted) C2-30 heteroallyl alkyl, (substituted) C2-30 heteroallyloxy, (substituted) C5-20 cycloalkyl, or (substituted) C5-20 heterocycloalkyl group] or its isomer. The **battery** has a cathode, containing S or a S compound; an anode; a separator between the cathode and the anode; and the above **electrolyte** solution
IC ICM H01M010-40
ICS H01M004-38; H01M004-58; H01M004-60
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST secondary **battery** org **electrolyte solvent** dialkoxy propane compd
IT Secondary **batteries**
(lithium; organic **electrolyte** solns. containing dialkoxy propane compds. in **solvents** for secondary **lithium sulfur batteries**)
IT **Battery electrolytes**
(organic **electrolyte** solns. containing dialkoxy propane compds. in **solvents** for secondary **lithium sulfur batteries**)
IT 111-96-6, Diethylene glycol dimethyl ether **126-33-0**, Sulfolane 646-06-0, Dioxolane 7439-93-2D, Lithium, salts 7704-34-9, Sulfur, uses 9002-88-4, Polyethylene 17081-21-9, 1,3-Dimethoxy propane 33454-82-9, Lithium trifluoromethanesulfonate 90076-65-6
RL: DEV (Device component use); USES (Uses)
(organic **electrolyte** solns. containing dialkoxy propane compds. in **solvents** for secondary **lithium sulfur batteries**)

IT **126-33-0**, Sulfolane
RL: DEV (Device component use); USES (Uses)
(organic **electrolyte** solns. containing dialkoxy propane compds. in **solvents** for secondary **lithium sulfur batteries**)
RN 126-33-0 HCAPLUS
CN Thiophene, tetrahydro-, 1,1-dioxide (8CI, 9CI) (CA INDEX NAME)



L70 ANSWER 4 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:243851 HCAPLUS
DN 140:220586
TI Effect of Polymer Layer on the Electrochemical Performance of **Lithium-Sulfur** Secondary Cells in Various Organic **Solvents**
AU Liu, Xingjiang; Murata, Toshio; Yasuda, Hideo; Yamachi, Masanori
CS Fundamental Technology Laboratory, Corporate R and D Center, Japan Storage Battery Co., Ltd., Japan
SO GS News Technical Report (2003), 62(1), 10-15
CODEN: GSNTAA; ISSN: 1348-5725
URL: http://www.nippondenchi.co.jp/npd/gsnews/no62/pdf/062_1_03.pdf
PB Nippon Denchi K.K.
DT Journal; (online computer file)
LA Japanese
AB The effect of a polyethylene oxide (PEO) coating on the electrochem. performance of **Li-S** secondary **batteries** was studied using various **solvents.** The **batteries** with PEO-based solid polymer **electrolyte** (SPE) coated on the **S** electrodes or **Li** electrodes showed better cycleability. A capacity retention of .apprx.100% was achieved with a **Li/S** cell using a PEO/SPE-coated S electrode with a mixture of 1,3-dioxolane (DOL) and diethylene glycol di-Me ether in the **electrolyte.** The formation of the SPE layer suppresses the diffusion of polysulfur anions to the Li anode. The discharge of the **Li/S battery** was dependent on the type of **electrolyte solvent.** A large discharge capacity was obtained by using an ether **solvent** and a capacity retention of >60% was achieved with a **battery** with the ether **solvents** DOL or tetrahydropyran.
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST ethylene oxide coating sulfur electrode **electrolyte solvent** lithium **battery**
IT **Battery** electrodes
Polymer **electrolytes**
Secondary **batteries**
(polyethylene oxide coating of electrodes of **lithium-sulfur batteries**)
IT Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(polyethylene oxide coating of electrodes of **lithium-sulfur batteries**)

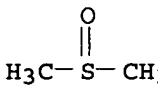
IT **67-68-5**, DMSO, uses **96-49-1**, Ethylene carbonate
105-58-8, Diethyl carbonate 109-99-9, THF, uses 110-71-4, Ethylene glycol dimethyl ether 142-68-7, Tetrahydropyran 646-06-0, 1,3-Dioxolane
RL: DEV (Device component use); USES (Uses)
(**electrolyte** containing; polyethylene oxide coating of electrodes of **lithium-sulfur batteries** with)

IT 25322-68-3, Polyethylene oxide
RL: DEV (Device component use); USES (Uses)
(polyethylene oxide coating of electrodes of **lithium-sulfur batteries**)

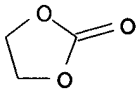
IT 7439-93-2, Lithium, uses
RL: DEV (Device component use); USES (Uses)
(surface composition of lithium anodes of **lithium-sulfur batteries**)

IT **67-68-5**, DMSO, uses **96-49-1**, Ethylene carbonate
RL: DEV (Device component use); USES (Uses)
(**electrolyte** containing; polyethylene oxide coating of electrodes of **lithium-sulfur batteries** with)

RN 67-68-5 HCAPLUS
CN Methane, sulfinylbis- (9CI) (CA INDEX NAME)



RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



L70 ANSWER 5 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2003:473082 HCAPLUS
DN 139:24151
TI Preparation of cathode for **lithium sulfur battery**
IN Choi, Jae-Young; Yoo, Duck-Young; Lee, Jong-Ki; Kim, Min-Seuk
PA Samsung SDI Co., Ltd., S. Korea
SO U.S. Pat. Appl. Publ., 12 pp.
CODEN: USXXCO
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2003113627	A1	20030619	US 2002-259293	20020930
	US 6908706	B2	20050621		
	KR 2003050475	A	20030625	KR 2001-80906	20011218
	CN 1427491	A	20030702	CN 2002-144424	20020927
	JP 2003208894	A2	20030725	JP 2002-366929	20021218
	JP 3677267	B2	20050727		
PRAI	KR 2001-80906	A	20011218		

AB Provided is a cathode including a current collector, and a cathode active

material layer laminated on the current collector, a method of making the cathode, and a **battery** including the cathode. The cathode active material includes particles having a core-shell structure with a sulfur-containing active material core, a conductor coating disposed on a surface of the active material core, and a binder coating disposed on the conductor coating. A high-performance **lithium sulfur battery** can be manufactured using the cathode, since sufficient bondability can be attained with only a small amount of a binder.

IC ICM H01M004-58
ICS H01M004-62
INCL 429218100; 429232000; 429217000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST cathode prepn **lithium sulfur battery**
IT Fluoropolymers, uses
Polyoxyalkylenes, uses
Styrene-butadiene rubber, uses
RL: MOA (Modifier or additive use); USES (Uses)
(binder coating; preparation of cathode for **lithium sulfur battery**)
IT **Battery** cathodes
Coating materials
(preparation of cathode for **lithium sulfur battery**)
IT Polysulfides
RL: DEV (Device component use); USES (Uses)
(preparation of cathode for **lithium sulfur battery**)
IT 9011-17-0, Hexafluoropropylene-vinylidene fluoride copolymer 24937-79-9, Polyvinylidene fluoride 25322-68-3, Peo
RL: MOA (Modifier or additive use); USES (Uses)
(binder coating; preparation of cathode for **lithium sulfur battery**)
IT 7440-44-0, Carbon, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(coating; preparation of cathode for **lithium sulfur battery**)
IT 9002-88-4, Polyethylene
RL: MOA (Modifier or additive use); USES (Uses)
(high d.; preparation of cathode for **lithium sulfur battery**)
IT 110-71-4 111-96-6, Diglyme 126-33-0, Sulfolane 646-06-0, Dioxolane 1314-23-4, Zirconium oxide (ZrO2), uses 7429-90-5, Aluminum, uses 7704-34-9, Sulfur, uses 21324-40-3, Lithium hexafluorophosphate 33454-82-9, Lithium triflate
RL: DEV (Device component use); USES (Uses)
(preparation of cathode for **lithium sulfur battery**)
IT 75-05-8, Acetonitrile, uses 109-99-9, Thf, uses 872-50-4, n-Methyl-2-pyrrolidone, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(**solvent**; preparation of cathode for **lithium sulfur battery**)
IT 9003-55-8
RL: MOA (Modifier or additive use); USES (Uses)
(styrene-butadiene rubber, binder coating; preparation of cathode for **lithium sulfur battery**)
RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

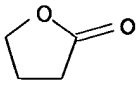
L70 ANSWER 6 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 2002:104915 HCAPLUS
DN 136:153902
TI Secondary nonaqueous **electrolyte battery**
IN Takami, Norio; Sato, Satoko
PA Toshiba Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 8 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

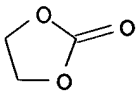
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2002042866	A2	20020208	JP 2000-227321	20000727
PRAI JP 2000-227321		20000727		

AB The **battery** has a cathode, an anode, and an **electrolyte** solution containing a Li salt dissolved in an organic **solvent** in a **battery** case, where the **battery** case wall is a ≤0.25 mm thick film, the Li salt contains Li+ and an anion having P, B, or S atom connected to perfluoroalkyl groups, and the **solvent** have vapor pressure ≤50 mm Hg at 100°.

IC ICM H01M010-40
ICS H01M002-02; H01M002-16
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST secondary lithium **battery electrolyte solvent** vapor pressure; perfluoroalkyl anion lithium salt **battery electrolyte**; phosphorus perfluoroalkyl anion lithium salt **battery electrolyte**; **battery** case film thickness secondary lithium **battery**; boron perfluoroalkyl anion lithium salt **battery electrolyte**; **sulfur** perfluoroalkyl anion **lithium** salt **battery electrolyte**
IT **Battery electrolytes**
Packaging materials
(lithium salts having perfluoroalkyl group containing anions for **electrolytes** in secondary lithium **batteries**)
IT **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate 872-36-6, Vinylene carbonate
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(controlled vapor pressure of **solvents** for lithium salt **electrolyte** in secondary lithium **batteries**)
IT 14283-07-9, Lithium fluoroborate 132843-44-8 365454-70-2 365454-71-3 390750-39-7
RL: DEV (Device component use); USES (Uses)
(lithium salts having perfluoroalkyl group containing anions for **electrolytes** in secondary lithium **batteries**)
IT 7429-90-5, Aluminum, uses 9003-07-0, Polypropylene
RL: DEV (Device component use); USES (Uses)
(polypropylene-aluminum laminate packages with controlled thickness for secondary lithium **batteries**)
IT **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(controlled vapor pressure of **solvents** for lithium salt **electrolyte** in secondary lithium **batteries**)
RN 96-48-0 HCAPLUS
CN 2(3H)-Furanone, dihydro- (8CI, 9CI) (CA INDEX NAME)



RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



L70 ANSWER 7 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:84081 HCAPLUS
DN 136:137403
TI **Electrolyte** for a **lithium-sulfur battery**
IN Hwang, Duckchul; Choi, Yunsuk; Choi, Sooseok; Lee, Jeawoan; Jung, Yongju; Kim, Joosoak
PA Samsung SDI Co. Ltd., S. Korea
SO Eur. Pat. Appl., 7 pp.
CODEN: EPXXDW
DT Patent
LA English

applicants

FAN.CNT 1

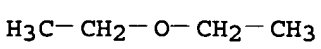
	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1176659	A2	20020130	EP 2001-117661	20010725
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	KR 2002008704	A	20020131	KR 2000-42736	20000725
	KR 2002008705	A	20020131	KR 2000-42737	20000725
	JP 2002075447	A2	20020315	JP 2001-213435	20010713
	US 2002102466	A1	20020801	US 2001-910952	20010724
	CN 1335653	A	20020213	CN 2001-132526	20010725
PRAI	KR 2000-42736	A	20000725		
	KR 2000-42737	A	20000725		

AB An **electrolyte** for a **lithium-sulfur battery** has a **solvent** having a **dielec.** constant that is greater than or equal to 20, a **solvent** having a **viscosity** that is less than or equal to 1.3, and an **electrolyte** salt. This **battery** shows excellent capacity and cycle life characteristics.
IC ICM H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **electrolyte lithium sulfur battery**
IT **Battery electrolytes**
(**electrolyte** for **lithium-sulfur battery**)
IT Secondary **batteries**
(lithium; **electrolyte** for **lithium-sulfur battery**)
IT **60-29-7**, Ethyl ether, uses **64-17-5**, Ethanol, uses **67-56-1**, Methanol, uses **67-63-0**, Isopropanol, uses **67-68-5**, Dmso, uses **68-12-2**, Dmf, uses **71-43-2**, Benzene, uses **75-05-8**, Acetonitrile, uses **78-93-3**,

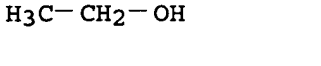
Methylethyl ketone, uses **79-20-9**, Methyl acetate **96-47-9**
, 2-Methyltetrahydrofuran **96-48-0**, γ-Butyrolactone
96-49-1, Ethylene carbonate **105-37-3**, Ethyl propionate
105-58-8, Diethyl carbonate **107-31-3**, Methyl formate
108-32-7, Propylene carbonate **109-60-4**, n-Propyl acetate
109-99-9, Thf, uses **110-71-4**, 1,2-Dimethoxyethane
110-82-7, Cyclohexane, uses **110-86-1**, Pyridine, uses
111-96-6, Diglyme **123-91-1**, p-Dioxane, uses
126-33-0, Sulfolane **141-78-6**, Ethyl acetate, uses
420-12-2, Ethylene sulfide **462-06-6**, Fluorobenzene
554-12-1, Methyl propionate **616-38-6**, Dimethyl carbonate
623-53-0, Ethylmethyl carbonate **646-06-0**, 1,3-Dioxolane
680-31-9, Hexamethylphosphoramide, uses 822-38-8, Ethylene
trithiocarbonate **872-36-6**, Vinylene carbonate 930-35-8,
Vinylene trithiocarbonate 3741-38-6, Ethylene sulfite 7704-34-9,
Sulfur, uses 7791-03-9, Lithium perchlorate 14283-07-9, Lithium
tetrafluoroborate **16508-95-5**, Bismuth carbonate 21324-40-3,
Lithium hexafluorophosphate **25496-08-6**, Fluorotoluene
29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate
74432-42-1, Lithium polysulfide 90076-65-6
RL: DEV (Device component use); USES (Uses)
(**electrolyte** for **lithium-sulfur**
battery)

IT **60-29-7**, Ethyl ether, uses **64-17-5**, Ethanol, uses
67-56-1, Methanol, uses **67-63-0**, Isopropanol, uses
67-68-5, Dmso, uses **68-12-2**, Dmf, uses **71-43-2**
, Benzene, uses **75-05-8**, Acetonitrile, uses **78-93-3**,
Methylethyl ketone, uses **79-20-9**, Methyl acetate **96-47-9**
, 2-Methyltetrahydrofuran **96-48-0**, γ-Butyrolactone
96-49-1, Ethylene carbonate **105-37-3**, Ethyl propionate
105-58-8, Diethyl carbonate **107-31-3**, Methyl formate
108-32-7, Propylene carbonate **109-60-4**, n-Propyl acetate
109-99-9, Thf, uses **110-71-4**, 1,2-Dimethoxyethane
110-82-7, Cyclohexane, uses **110-86-1**, Pyridine, uses
111-96-6, Diglyme **123-91-1**, p-Dioxane, uses
126-33-0, Sulfolane **141-78-6**, Ethyl acetate, uses
462-06-6, Fluorobenzene **554-12-1**, Methyl propionate
616-38-6, Dimethyl carbonate **623-53-0**, Ethylmethyl
carbonate **646-06-0**, 1,3-Dioxolane **680-31-9**,
Hexamethylphosphoramide, uses **872-36-6**, Vinylene carbonate
16508-95-5, Bismuth carbonate **25496-08-6**, Fluorotoluene
RL: DEV (Device component use); USES (Uses)
(**electrolyte** for **lithium-sulfur**
battery)

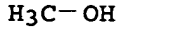
RN 60-29-7 HCAPLUS
CN Ethane, 1,1'-oxybis- (9CI) (CA INDEX NAME)



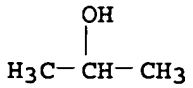
RN 64-17-5 HCAPLUS
CN Ethanol (9CI) (CA INDEX NAME)



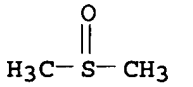
RN 67-56-1 HCAPLUS
CN Methanol (8CI, 9CI) (CA INDEX NAME)



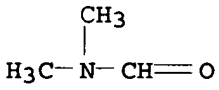
RN 67-63-0 HCAPLUS
CN 2-Propanol (9CI) (CA INDEX NAME)



RN 67-68-5 HCAPLUS
CN Methane, sulfinylbis- (9CI) (CA INDEX NAME)

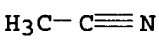


RN 68-12-2 HCAPLUS
CN Formamide, N,N-dimethyl- (8CI, 9CI) (CA INDEX NAME)

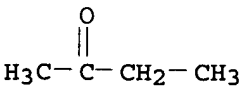


RN 71-43-2 HCAPLUS
CN Benzene (8CI, 9CI) (CA INDEX NAME)

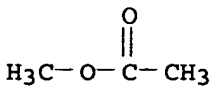
RN 75-05-8 HCAPLUS
CN Acetonitrile (8CI, 9CI) (CA INDEX NAME)



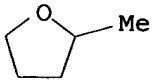
RN 78-93-3 HCAPLUS
CN 2-Butanone (8CI, 9CI) (CA INDEX NAME)



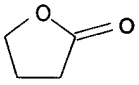
RN 79-20-9 HCAPLUS
CN Acetic acid, methyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



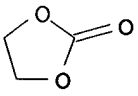
RN 96-47-9 HCAPLUS
CN Furan, tetrahydro-2-methyl- (8CI, 9CI) (CA INDEX NAME)



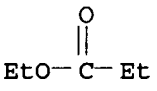
RN 96-48-0 HCAPLUS
CN 2(3H)-Furanone, dihydro- (8CI, 9CI) (CA INDEX NAME)



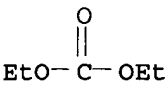
RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



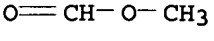
RN 105-37-3 HCAPLUS
CN Propanoic acid, ethyl ester (9CI) (CA INDEX NAME)



RN 105-58-8 HCAPLUS
CN Carbonic acid, diethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)

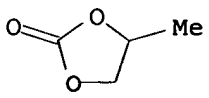


RN 107-31-3 HCAPLUS
CN Formic acid, methyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 108-32-7 HCAPLUS

CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



RN 109-60-4 HCAPLUS
CN Acetic acid, propyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)

n-Pr—O—Ac

RN 109-99-9 HCAPLUS
CN Furan, tetrahydro- (7CI, 8CI, 9CI) (CA INDEX NAME)

RN 110-71-4 HCAPLUS
CN Ethane, 1,2-dimethoxy- (8CI, 9CI) (CA INDEX NAME)

MeO—CH_2—CH_2—OMe

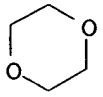
RN 110-82-7 HCAPLUS
CN Cyclohexane (8CI, 9CI) (CA INDEX NAME)

RN 110-86-1 HCAPLUS
CN Pyridine (6CI, 7CI, 8CI, 9CI) (CA INDEX NAME)

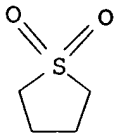
RN 111-96-6 HCAPLUS
CN Ethane, 1,1'-oxybis[2-methoxy- (9CI) (CA INDEX NAME)

MeO—CH_2—CH_2—O—CH_2—CH_2—OMe

RN 123-91-1 HCAPLUS
CN 1,4-Dioxane (9CI) (CA INDEX NAME)



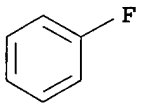
RN 126-33-0 HCAPLUS
CN Thiophene, tetrahydro-, 1,1-dioxide (8CI, 9CI) (CA INDEX NAME)



RN 141-78-6 HCAPLUS
CN Acetic acid ethyl ester (8CI, 9CI) (CA INDEX NAME)

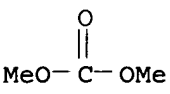
Et—O—Ac

RN 462-06-6 HCAPLUS
CN Benzene, fluoro- (8CI, 9CI) (CA INDEX NAME)

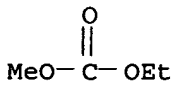


RN 554-12-1 HCAPLUS
CN Propanoic acid, methyl ester (9CI) (CA INDEX NAME)

RN 616-38-6 HCAPLUS
CN Carbonic acid, dimethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)

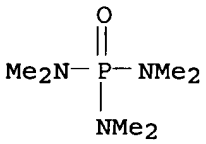


RN 623-53-0 HCAPLUS
CN Carbonic acid, ethyl methyl ester (7CI, 8CI, 9CI) (CA INDEX NAME)

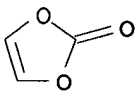


RN 646-06-0 HCAPLUS
CN 1,3-Dioxolane (6CI, 8CI, 9CI) (CA INDEX NAME)

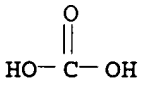
RN 680-31-9 HCAPLUS
CN Phosphoric triamide, hexamethyl- (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 872-36-6 HCAPLUS
CN 1,3-Dioxol-2-one (9CI) (CA INDEX NAME)



RN 16508-95-5 HCAPLUS
CN Carbonic acid, bismuth(3+) salt (3:2) (8CI, 9CI) (CA INDEX NAME)



●2/3 Bi(III)

RN 25496-08-6 HCAPLUS
CN Benzene, fluoromethyl- (9CI) (CA INDEX NAME)

D1—F

D1—Me

L70 ANSWER 8 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2002:84080 HCAPLUS
DN 136:137402
TI **Electrolyte** for a **lithium-sulfur battery**
IN Hwang, Duckchul; Choi, Yunsuk; Choi, Sooseok; Lee, Jeawoan; Jung, Yongju; Kim, Joosoak
PA Samsung SDI Co. Ltd., S. Korea
SO Eur. Pat. Appl., 11 pp.
CODEN: EPXXDW
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 1176658	A2	20020130	EP 2001-117642	20010724
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
	KR 2002008703	A	20020131	KR 2000-42735	20000725
	KR 2002014196	A	20020225	KR 2000-47348	20000817
	JP 2002083633	A2	20020322	JP 2001-213414	20010713
	US 2002045101	A1	20020418	US 2001-911083	20010724
	US 6852450	B2	20050208		
	CN 1335652	A	20020213	CN 2001-132525	20010725
PRAI	KR 2000-42735	A	20000725		
	KR 2000-47348	A	20000817		

AB An **electrolyte** for a **lithium-sulfur battery** includes a **first component solvent** with a sulfur solubility more than or equal to 20 mM, a **second component solvent** with a sulfur solubility less than 20 mM, a third **component solvent** with a high **dielec.** constant and a high **viscosity**, and an **electrolyte** salt. This **battery** shows excellent capacity and cycle life characteristics.
IC ICM H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST **electrolyte lithium sulfur battery**
IT **Battery electrolytes**
(**electrolyte** for **lithium-sulfur battery**)
IT Secondary **batteries**
(lithium; **electrolyte** for **lithium-sulfur battery**)
IT Synthetic polymeric fibers, uses
RL: DEV (Device component use); USES (Uses)

(polysulfides, carbon-polysulfur polymer; **electrolyte** for **lithium-sulfur battery**)

IT Lithium alloy, base
RL: DEV (Device component use); USES (Uses)
(**electrolyte** for **lithium-sulfur battery**)

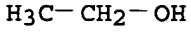
IT 7440-44-0, Super P, uses
RL: MOA (Modifier or additive use); USES (Uses)
(activated; **electrolyte** for **lithium-sulfur battery**)

IT **64-17-5**, Ethanol, uses **67-63-0**, Isopropanol, uses **71-43-2**, Benzene, uses **79-20-9**, Methyl acetate **96-47-9**, 2-Methyltetrahydrofuran **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate **105-37-3**, Ethyl propionate **105-58-8**, Diethyl carbonate **108-32-7**, Propylene carbonate **108-88-3**, Toluene, uses 108-94-1, Cyclohexanone, uses **109-60-4**, Propyl acetate **109-99-9**, Thf, uses **110-71-4 110-82-7**, Cyclohexane, uses **111-96-6**, Diglyme **126-33-0**, Sulfolane **141-78-6**, Ethyl acetate, uses 143-24-8, Tetraglyme **462-06-6**, Fluorobenzene **554-12-1**, Methyl propionate **616-38-6**, Dimethyl carbonate **623-53-0**, Ethylmethyl carbonate **646-06-0**, 1,3-Dioxolane 1330-20-7, Xylene, uses 7439-93-2, Lithium, uses 7704-34-9, Sulfur, uses 7704-34-9D, Sulfur, organic compound 7791-03-9, Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 27359-10-0, Trifluorotoluene 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 56525-42-9, Methylpropyl carbonate 74432-42-1, Lithium polysulfide 90076-65-6
RL: DEV (Device component use); USES (Uses)
(**electrolyte** for **lithium-sulfur battery**)

IT 124-38-9, Carbon dioxide, uses 7446-09-5, Sulfur dioxide, uses 9003-20-7, Polyvinyl acetate 10024-97-2, Nitrous oxide, uses
RL: MOA (Modifier or additive use); USES (Uses)
(**electrolyte** for **lithium-sulfur battery**)

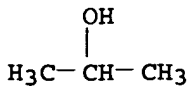
IT **64-17-5**, Ethanol, uses **67-63-0**, Isopropanol, uses **71-43-2**, Benzene, uses **79-20-9**, Methyl acetate **96-47-9**, 2-Methyltetrahydrofuran **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate **105-37-3**, Ethyl propionate **105-58-8**, Diethyl carbonate **108-32-7**, Propylene carbonate **108-88-3**, Toluene, uses **109-60-4**, Propyl acetate **109-99-9**, Thf, uses **110-71-4 110-82-7**, Cyclohexane, uses **111-96-6**, Diglyme **126-33-0**, Sulfolane **141-78-6**, Ethyl acetate, uses **462-06-6**, Fluorobenzene **554-12-1**, Methyl propionate **616-38-6**, Dimethyl carbonate **623-53-0**, Ethylmethyl carbonate **646-06-0**, 1,3-Dioxolane
RL: DEV (Device component use); USES (Uses)
(**electrolyte** for **lithium-sulfur battery**)

RN 64-17-5 HCAPLUS
CN Ethanol (9CI) (CA INDEX NAME)



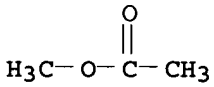
RN 67-63-0 HCAPLUS

CN 2-Propanol (9CI) (CA INDEX NAME)

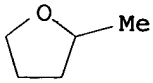


RN 71-43-2 HCAPLUS
CN Benzene (8CI, 9CI) (CA INDEX NAME)

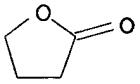
RN 79-20-9 HCAPLUS
CN Acetic acid, methyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



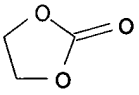
RN 96-47-9 HCAPLUS
CN Furan, tetrahydro-2-methyl- (8CI, 9CI) (CA INDEX NAME)



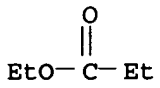
RN 96-48-0 HCAPLUS
CN 2(3H)-Furanone, dihydro- (8CI, 9CI) (CA INDEX NAME)



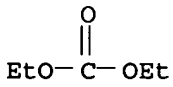
RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



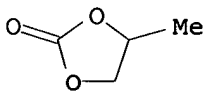
RN 105-37-3 HCAPLUS
CN Propanoic acid, ethyl ester (9CI) (CA INDEX NAME)



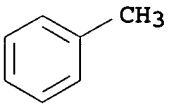
RN 105-58-8 HCAPLUS
CN Carbonic acid, diethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



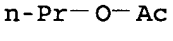
RN 108-32-7 HCAPLUS
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



RN 108-88-3 HCAPLUS
CN Benzene, methyl- (9CI) (CA INDEX NAME)



RN 109-60-4 HCAPLUS
CN Acetic acid, propyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 109-99-9 HCAPLUS
CN Furan, tetrahydro- (7CI, 8CI, 9CI) (CA INDEX NAME)

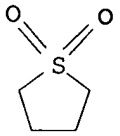
RN 110-71-4 HCAPLUS
CN Ethane, 1,2-dimethoxy- (8CI, 9CI) (CA INDEX NAME)

RN 110-82-7 HCAPLUS
CN Cyclohexane (8CI, 9CI) (CA INDEX NAME)

RN 111-96-6 HCAPLUS
CN Ethane, 1,1'-oxybis[2-methoxy- (9CI) (CA INDEX NAME)

MeO— CH_2— CH_2— O— CH_2— CH_2— OMe

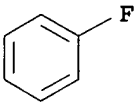
RN 126-33-0 HCAPLUS
CN Thiophene, tetrahydro-, 1,1-dioxide (8CI, 9CI) (CA INDEX NAME)



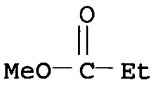
RN 141-78-6 HCAPLUS
CN Acetic acid ethyl ester (8CI, 9CI) (CA INDEX NAME)

Et— O— Ac

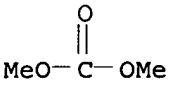
RN 462-06-6 HCAPLUS
CN Benzene, fluoro- (8CI, 9CI) (CA INDEX NAME)



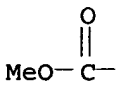
RN 554-12-1 HCAPLUS
CN Propanoic acid, methyl ester (9CI) (CA INDEX NAME)



RN 616-38-6 HCAPLUS
CN Carbonic acid, dimethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 623-53-0 HCAPLUS
CN Carbonic acid, ethyl methyl ester (7CI, 8CI, 9CI) (CA INDEX NAME)



RN 646-06-0 HCAPLUS
CN 1,3-Dioxolane (6CI, 8CI, 9CI) (CA INDEX NAME)

L70 ANSWER 9 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:360320 HCAPLUS
DN 134:355476
TI Lithium primary **batteries**
IN Mikhaylik, Yuriy V.; Skotheim, Terje A.; Angell, Charles A.
PA Moltech Corporation, USA
SO PCT Int. Appl., 35 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2001035475	A1	20010517	WO 2000-US30911	20001110

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

PRAI US 1999-165154P P 19991112
OS MARPAT 134:355476
AB In a lithium primary **battery**, the cathode comprises an electroactive sulfur-containing material and the **electrolyte** comprises one or more nonaq. **solvents** and one or more voltage-enhancing reactive components, wherein the reactive components are non-electroactive but enhance the voltage of the lithium primary **battery.** Suitable voltage-enhancing reactive components include organic halides, inorg. halides, and phosphorus chalcogenides. Also are provided methods for making the lithium primary **battery.**
IC ICM H01M006-16
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST lithium primary **battery**
IT Primary **batteries**
(button-type; lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Ethers, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(cyclic; lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT **Battery** cathodes
Battery electrolytes
(lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Polysulfides
RL: DEV (Device component use); USES (Uses)
(lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Esters, uses
Ethers, uses
Polyethers, uses
Sulfites
Sulfones
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Carbon black, uses
Carbon fibers, uses
Halides
RL: MOA (Modifier or additive use); USES (Uses)
(lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Primary **batteries**
(lithium; lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Halides
RL: MOA (Modifier or additive use); USES (Uses)
(organic; lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Hydrocarbons, uses
RL: MOA (Modifier or additive use); USES (Uses)
(perchlorocarbons; lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT Group VA element chalcogenides
RL: MOA (Modifier or additive use); USES (Uses)
(phosphorus chalcogenides; lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT 7439-93-2, Lithium, uses 7440-44-0D, Carbon, lithium intercalated, uses 7550-35-8, Lithium bromide 7704-34-9, **Sulfur**, uses 10377-51-2, Lithium iodide 12798-95-7 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 39448-96-9, Graphite lithium 53680-59-4 74432-42-1, Lithium polysulfide 90076-65-6 132404-42-3
RL: DEV (Device component use); USES (Uses)

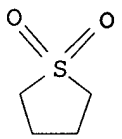
(**lithium** primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT **126-33-0**, Sulfolane
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT 56-23-5, Carbon tetrachloride, uses 1314-56-3, Phosphorus oxide (P2O5), uses 1314-80-3, Phosphorus sulfide p2s5 2551-62-4, **Sulfur** hexafluoride 7446-70-0, Aluminum chloride, uses 7550-45-0, Titanium tetrachloride, uses 7637-07-2, Boron trifluoride, uses 7647-19-0, Phosphorus pentafluoride 7719-12-2, Phosphorus trichloride 7783-60-0, **Sulfur** tetrafluoride 7784-18-1, Aluminum fluoride 7786-30-3, Magnesium chloride, uses 10026-04-7, Silicon tetrachloride 10026-13-8, Phosphorus pentachloride 10294-34-5, Boron trichloride 16752-60-6, Phosphorus pentoxide dimer 158970-02-6, Phosphorus oxide sulfide
RL: MOA (Modifier or additive use); USES (Uses)
(**lithium** primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

IT **126-33-0**, Sulfolane
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(lithium primary **batteries** with electroactive sulfur-containing material cathode and **electrolyte** with voltage-enhancing reactive components)

RN 126-33-0 HCAPLUS
CN Thiophene, tetrahydro-, 1,1-dioxide (8CI, 9CI) (CA INDEX NAME)



RE.CNT 10 THERE ARE 10 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L70 ANSWER 10 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2000:141485 HCAPLUS
DN 132:168757
TI Liquid **electrolyte lithium-sulfur batteries**
IN Chu, May-Ying; De Jonghe, Lutgard C.; Visco, Steven J.; Katz, Bruce D.
PA Polyplus Battery Co., Inc., USA
SO U.S., 28 pp., Cont.-in-part of U.S. 5,686,201
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 15

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 6030720	A	20000229	US 1997-948969	19971010
	US 5523179	A	19960604	US 1994-344384	19941123
	US 5582623	A	19961210	US 1995-479687	19950607
	US 5686201	A	19971111	US 1996-686609	19960726

CA 2305454	AA	19990422	CA 1998-2305454	19981006
WO 9919931	A1	19990422	WO 1998-US21067	19981006
W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
AU 9896876	A1	19990503	AU 1998-96876	19981006
AU 741815	B2	20011213		
EP 1021849	A1	20000726	EP 1998-950967	19981006
EP 1021849	B1	20030122		
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
BR 9812749	A	20000829	BR 1998-12749	19981006
JP 2001520447	T2	20011030	JP 2000-516392	19981006
AT 231653	E	20030215	AT 1998-950967	19981006
US 6358643	B1	20020319	US 2000-495639	20000201
PRAI US 1994-344384	A2	19941123		
US 1995-479687	A2	19950607		
US 1996-686609	A2	19960726		
US 1997-948969	A	19971010		
WO 1998-US21067	W	19981006		

OS MARPAT 132:168757

AB Disclosed are **electrolyte solvents** for ambient-temperature **lithium-sulfur batteries.** The disclosed **solvents** include at least one ethoxy repeating unit compound of the general formula R1(CH2CH2O)nR2, where n ranges between 2 and 10 and R1 and R2 are different or identical alkyl or alkoxy groups (including substituted alkyl or alkoxy groups). Alternatively, R1 and R2 may together with (CH2CH2O)n form a closed ring. Examples of linear **solvents** include the glymes (CH3O(CH2 CH2)nCH3). Some **electrolyte solvents** include a donor or acceptor **solvent** in addition to an ethoxy compound as described. Examples of donor **solvents** include hexamethylphosphoramide, pyridine, N,N-diethylacetamide, N,N-diethylformamide, dimethylsulfoxide, tetramethylurea, N,N-dimethylacetamide, N,N-dimethylformamide, tributylphosphate, trimethylphosphate, N,N,N',N'-tetraethylsulfamide, tetramethylenediamine, tetramethylpropylenediamine, and pentamethyldiethylenetriamine. These assist in solvation of lithium ions. Examples of acceptor **solvents** include alcs., glycols, and polyglycols. These assist in solvation of the sulfide and polysulfide anions.

IC ICM H01M010-40

INCL 429105000

CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)

ST **battery lithium sulfur** liq **electrolyte**

IT **Battery electrolytes**
Conducting polymers
(liquid **electrolyte lithium-sulfur batteries**)

IT Carbon black, uses
Polyoxyalkylenes, uses
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(liquid **electrolyte lithium-sulfur**

batteries)

IT Alcohols, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT Crown ethers
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT Cryptands
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT Glycols, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT Secondary **batteries**
(lithium; liquid **electrolyte lithium-sulfur batteries**)

IT Intercalation compounds
RL: DEV (Device component use); USES (Uses)
(lithium; liquid **electrolyte lithium-sulfur batteries**)

IT 7439-93-2, Lithium, uses 7439-93-2D, Lithium, intercalation compound, uses 7440-23-5, Sodium, uses 7704-34-9, Sulfur, uses 90076-65-6
RL: DEV (Device component use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT 25322-68-3, Polyethylene oxide
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

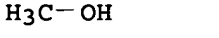
IT **67-56-1**, Methanol, uses **67-68-5**, Dimethylsulfoxide, uses **68-12-2**, N,N-Dimethylformamide, uses 75-52-5, Nitromethane, uses 76-05-1, Trifluoroacetic acid, uses 107-21-1, Ethylene glycol, uses 110-60-1, Tetramethylenediamine 110-86-1, Pyridine, uses 110-95-2, Tetramethylpropylenediamine 126-73-8, Tributylphosphate, uses 127-19-5, N,N-Dimethylacetamide 143-24-8, Tetraglyme 294-93-9, 12-Crown-4 512-56-1, Trimethylphosphate 617-84-5, N,N-Diethylformamide 632-22-4, Tetramethylurea **680-31-9**, Hexamethylphosphoramide, uses 685-91-6, N,N-Diethylacetamide 1493-13-6, Trifluoromethanesulfonic acid 2832-49-7, N,N,N',N'-Tetraethylsulfamide 3030-47-5, Pentamethyldiethylenetriamine 7446-09-5, Sulfur dioxide, uses 7637-07-2, Boron trifluoride, uses 14187-32-7, Dibenzo 18-crown-6 17455-13-9, 18-Crown-6 33100-27-5, 15-Crown-5
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT 7440-44-0, Carbon, uses
RL: MOA (Modifier or additive use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

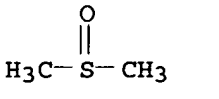
IT **67-56-1**, Methanol, uses **67-68-5**, Dimethylsulfoxide, uses

68-12-2, N,N-Dimethylformamide, uses **680-31-9**, Hexamethylphosphoramide, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

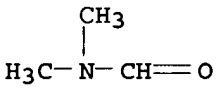
RN 67-56-1 HCAPLUS
CN Methanol (8CI, 9CI) (CA INDEX NAME)



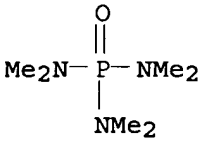
RN 67-68-5 HCAPLUS
CN Methane, sulfinylbis- (9CI) (CA INDEX NAME)



RN 68-12-2 HCAPLUS
CN Formamide, N,N-dimethyl- (8CI, 9CI) (CA INDEX NAME)



RN 680-31-9 HCAPLUS
CN Phosphoric triamide, hexamethyl- (6CI, 8CI, 9CI) (CA INDEX NAME)



RE.CNT 24 THERE ARE 24 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L70 ANSWER 11 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:814077 HCAPLUS
DN 132:52401
TI Secondary nonaqueous **electrolyte** lithium **batteries** using specific **electrolyte** solutions
IN Sakaguchi, Taeko; Sunakawa, Takuya; Fujimoto, Hiroyuki; Watanabe, Hiroshi; Noma, Toshiyuki; Nishio, Akiharu
PA Sanyo Electric Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

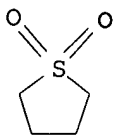
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI JP 11354156 A2 19991224 JP 1998-157759 19980605
PRAI JP 1998-157759 19980605
OS MARPAT 132:52401
AB The **batteries** use cathodes of LiaCobMcNi1-b-cO2 (M = Mn, B, Mg, Al, Si, Ca, Ti, V, Fe, Cu, Zn, and/or Ga; a = 0-1.2; b, c = 0.01-0.4; b + c = 0.02-0.5), anodes of Li or Li-intercalatable substances, separators, and nonaq. **electrolyte** solns. containing **electrolyte** salts selected from LiN(CnF2n+1SO2)(CmF2m+1SO2) and LiC(CnF2n+1SO2)2(CmF2m+1SO2) (n, m = 1-5; n = m ≠ 1) and **solvents** including 5- or 6-membered heterocycles containing O, S, and/or N atoms. The **batteries** have long cycle life.
IC ICM H01M010-40
ICS H01M010-40; H01M004-02; H01M004-58
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST **battery** cathode lithium imide **electrolyte**; heterocyclic **solvent** lithium **electrolyte** **battery**; cycle life **battery electrolyte** lithium imide
IT Secondary **batteries**
(lithium; secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)
IT Heterocyclic compounds
RL: DEV (Device component use); USES (Uses)
(nitrogen; secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)
IT Heterocyclic compounds
RL: DEV (Device component use); USES (Uses)
(oxygen; secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)
IT **Battery** cathodes
Battery electrolytes
(secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)
IT Heterocyclic compounds
RL: DEV (Device component use); USES (Uses)
(**sulfur**; secondary **Li batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)
IT 109-02-4, N-Methylmorpholine **126-33-0**, Sulfolane 288-14-2, Isoxazole 872-36-6, Vinylene carbonate 872-50-4, uses 1120-71-4, 1,3-Propane sultone 28452-93-9, Butadiene sulfone 119229-99-1 132843-44-8, Lithium bis(pentafluoroethylsulfonyl)imide 176719-70-3, Lithium trifluoromethanesulfonyl(nonafluorobutanesulfonyl)imide 210406-62-5 227098-71-7 252877-06-8 252877-07-9, Cobalt lithium manganese nickel oxide (Co0.6LiMn0.3Ni0.1O2)
RL: DEV (Device component use); USES (Uses)
(secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)
IT 191024-83-6P, Cobalt lithium manganese nickel oxide (Co0.4LiMn0.1Ni0.5O2) 193215-05-3P, Cobalt lithium manganese nickel oxide (Co0.2LiMn0.2Ni0.6O2) 193215-53-1P, Cobalt lithium manganese nickel oxide (Co0.2LiMn0.3Ni0.5O2) 193215-92-8P, Cobalt lithium manganese nickel oxide (Co0.1LiMn0.4Ni0.5O2) 223923-05-5P, Cobalt lithium manganese nickel oxide (Co0.3LiMn0.1Ni0.6O2) 244304-31-2P, Cobalt lithium manganese nickel oxide

(Co0.01LiMn0.01Ni0.98O2) 244304-32-3P, Cobalt lithium manganese nickel oxide (Co0.01LiMn0.2Ni0.79O2) 244304-33-4P, Cobalt lithium manganese nickel oxide (Co0.01LiMn0.4Ni0.59O2) 244304-34-5P, Cobalt lithium manganese nickel oxide (Co0.2LiMn0.01Ni0.79O2) 244304-35-6P, Cobalt lithium manganese nickel oxide (Co0.4LiMn0.01Ni0.59O2) 244304-36-7P, Cobalt lithium nickel borate oxide (Co0.3LiNi0.6(BO3)0.1O1.7) 244304-37-8P, Cobalt lithium magnesium nickel oxide (Co0.3LiMg0.1Ni0.6O2) 244304-38-9P, Aluminum cobalt lithium nickel oxide (Al0.1Co0.3LiNi0.6O2) 244304-40-3P, Calcium cobalt lithium nickel oxide (Ca0.1Co0.3LiNi0.6O2) 244304-42-5P, Cobalt lithium nickel titanium oxide (Co0.3LiNi0.6Ti0.1O2) 244304-43-6P, Cobalt lithium nickel vanadium oxide (Co0.3LiNi0.6V0.1O2) 244304-45-8P, Cobalt iron lithium nickel oxide (Co0.3Fe0.1LiNi0.6O2) 244304-46-9P, Cobalt copper lithium nickel oxide (Co0.3Cu0.1LiNi0.6O2) 244304-47-0P, Cobalt lithium nickel zinc oxide (Co0.3LiNi0.6Zn0.1O2) 244304-48-1P, Cobalt gallium lithium nickel oxide (Co0.3Ga0.1LiNi0.6O2) 252877-05-7P, Cobalt lithium nickel oxide silicate (Co0.3LiNi0.6O1.6(SiO4)0.1)
RL: DEV (Device component use); PNU (Preparation, unclassified); PREP (Preparation); USES (Uses)
(secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)

IT **126-33-0**, Sulfolane
RL: DEV (Device component use); USES (Uses)
(secondary Li **batteries** using mixed oxide cathodes and Li **electrolytes** in nonaq. heterocyclic **solvents** for long cycle life)

RN 126-33-0 HCAPLUS
CN Thiophene, tetrahydro-, 1,1-dioxide (8CI, 9CI) (CA INDEX NAME)



L70 ANSWER 12 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:271600 HCAPLUS
DN 130:284490
TI Liquid **electrolyte lithium-sulfur batteries**
IN Chu, May-Ying; De Jonghe, Lutgard C.; Visco, Steven J.; Katz, Bruce D.
PA Polyplus Battery Company, Inc., USA
SO PCT Int. Appl., 57 pp.
CODEN: PIXXD2
DT Patent
LA English
FAN.CNT 15

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 9919931	A1	19990422	WO 1998-US21067	19981006

W: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, SD, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES,

FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG

US 6030720	A	20000229	US 1997-948969	19971010
CA 2305454	AA	19990422	CA 1998-2305454	19981006
AU 9896876	A1	19990503	AU 1998-96876	19981006
AU 741815	B2	20011213		
EP 1021849	A1	20000726	EP 1998-950967	19981006
EP 1021849	B1	20030122		

R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO

BR 9812749	A	20000829	BR 1998-12749	19981006
JP 2001520447	T2	20011030	JP 2000-516392	19981006
AT 231653	E	20030215	AT 1998-950967	19981006
PRAI US 1997-948969	A	19971010		
US 1994-344384	A2	19941123		
US 1995-479687	A2	19950607		
US 1996-686609	A2	19960726		
WO 1998-US21067	W	19981006		

OS MARPAT 130:284490

AB Disclosed are **electrolyte solvents** for ambient-temperature **lithium-sulfur batteries.** The disclosed **solvents** include at least one ethoxy repeating unit compound of the general formula R1(CH2CH2O)nR2, where n ranges between 2 and 10 and R1 and R2 are different or identical alkyl or alkoxy groups (including substituted alkyl or alkoxy groups). Alternatively, R1 and R2 may together with (CH2CH2O)n form a closed ring. Examples of linear **solvents** include the glymes (CH3O(CH2CH2)nCH3). Some **electrolyte solvents** include a donor or acceptor **solvent** in addition to an ethoxy compound as described. Examples of donor **solvents** include hexamethylphosphoramide, pyridine, N,N-diethylacetamide, N,N-diethylformamide, dimethylsulfoxide, tetramethylurea, N,N-dimethylacetamide, N,N-dimethylformamide, tributylphosphate, trimethylphosphate, N,N,N',N'-tetraethylsulfamide, tetramethylenediamine, tetramethylpropylenediamine, and pentamethyldiethylenetriamine. These assist in solvation of lithium ions. Examples of acceptor **solvents** include alcs., glycols, and polyglycols. These assist in solvation of the sulfide and polysulfide anions.

IC ICM H01M010-40

CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)

ST **electrolyte solvent lithium sulfur battery**

IT **Battery** cathodes
Battery electrolytes
Secondary **batteries**
(liquid **electrolyte lithium-sulfur batteries**)

IT Alcohols, uses
Carbon black, uses
Carbon fibers, uses
Glycols, uses
Polyoxyalkylenes, uses
Polysulfides
Sulfides, uses
RL: DEV (Device component use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT Crown ethers
RL: MOA (Modifier or additive use); USES (Uses)

(liquid **electrolyte lithium-sulfur batteries**)

IT Cryptands
RL: MOA (Modifier or additive use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

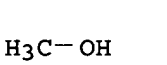
IT 143-24-8, Tetraethyleneglycol dimethyl ether 7439-93-2, Lithium, uses 7439-93-2D, Lithium, intercalation compound, uses 7440-23-5, Sodium, uses 7440-44-0, Carbon, uses 7704-34-9, Sulfur, uses 7791-03-9, Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 25322-68-3, Peo 29935-35-1, Lithium hexafluoroarsenate 33454-82-9, Lithium triflate 74432-42-1, Lithium polysulfide 90076-65-6
RL: DEV (Device component use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT **67-56-1**, Methanol, uses **67-68-5**, Dimethylsulfoxide, uses **68-12-2**, N,N-Dimethylformamide, uses 75-52-5, Nitromethane, uses 76-05-1, Trifluoroacetic acid, uses 107-21-1, Ethylene glycol, uses 110-60-1, Tetramethylenediamine 110-86-1, Pyridine, uses 110-95-2, Tetramethylpropylenediamine 126-73-8, Tributylphosphate, uses 127-19-5, N,N-Dimethylacetamide 512-56-1, Trimethylphosphate 617-84-5, N,N-Diethylformamide 632-22-4, Tetramethylurea **680-31-9**, Hexamethylphosphoramide, uses 685-91-6, N,N-Diethylacetamide 1493-13-6, Trifluoromethanesulfonic acid 1822-45-3, Tetramethylpropylenediamine 2832-49-7, N,N,N',N'-Tetraethylsulfamide 3030-47-5, Pentamethyldiethylenetriamine. 7446-09-5, Sulfur dioxide, uses 7637-07-2, Boron trifluoride, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

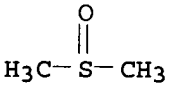
IT 294-93-9, 12-Crown-4 14187-32-7, Dibenzo-18-crown-6 17455-13-9, 18-Crown-6 33100-27-5, 15-Crown-5
RL: MOA (Modifier or additive use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

IT **67-56-1**, Methanol, uses **67-68-5**, Dimethylsulfoxide, uses **68-12-2**, N,N-Dimethylformamide, uses **680-31-9**, Hexamethylphosphoramide, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(liquid **electrolyte lithium-sulfur batteries**)

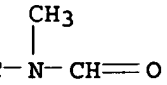
RN 67-56-1 HCAPLUS
CN Methanol (8CI, 9CI) (CA INDEX NAME)



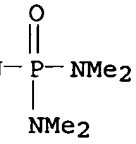
RN 67-68-5 HCAPLUS
CN Methane, sulfinylbis- (9CI) (CA INDEX NAME)



RN 68-12-2 HCAPLUS
CN Formamide, N,N-dimethyl- (8CI, 9CI) (CA INDEX NAME)



RN 680-31-9 HCAPLUS
CN Phosphoric triamide, hexamethyl- (6CI, 8CI, 9CI) (CA INDEX NAME)



RE.CNT 7 THERE ARE 7 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L70 ANSWER 13 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1998:684699 HCAPLUS
DN 129:304528
TI Secondary nonaqueous **electrolyte batteries**
IN Hayashi, Katsuya; Nemoto, Yasue; Tobishima, Shinichi; Yamaki, Junichi
PA Nippon Telegraph and Telephone Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 12 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

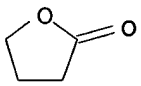
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10284120	A2	19981023	JP 1997-97946	19970402
PRAI JP 1997-97946		19970402		

AB The **batteries** use Li intercalating electrodes and an **electrolyte** solution containing an ionic Li salt LiX dissolved in an organic **solvent** mixture; where ratio of the **solvent S** having higher **Li+** solvation number, n, in the mixture is controlled at (4/5) ≤[(S)/n(LiX)] ≤(6/5), where (S) and (LiX) are the molar concentration of a **solvent** S and LiX in the **electrolyte** solution, resp. The Li salt is selected from LiPF6, LiBF4, LiClO4, (CF3SO2)2NLi, and (CF3SO2)3CLi, and the **solvents** contain 1, 2-dialkoxy ethanes, which may be mixed with propylene carbonate, ethylene carbonate, di-Me carbonate, and/or γ-butyrolactone.
IC ICM H01M010-40
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST lithium **battery electrolyte solvent** solvation no
IT **Battery electrolytes**
Solvation number
(mixing ratio of **solvents** with high lithium ion solvation nos. in **electrolyte solvent** mixts. for secondary lithium **batteries**)
IT **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate **108-32-7**, Propylene carbonate **110-71-4**,

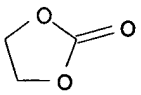
1,2-Dimethoxyethane **616-38-6**, Dimethyl carbonate 629-14-1, 1,2-Diethoxyethane 5137-45-1, 1-Ethoxy-2-methoxyethane 7791-03-9, Lithium perchlorate 14283-07-9, Lithium fluoroborate 21324-40-3, Lithium hexafluorophosphate 90076-65-6 132404-42-3
RL: DEV (Device component use); USES (Uses)
(mixing ratio of **solvents** with high lithium ion solvation nos. in **electrolyte solvent** mixts. for secondary lithium **batteries**)

IT **96-48-0**, γ-Butyrolactone **96-49-1**, Ethylene carbonate **108-32-7**, Propylene carbonate **110-71-4**, 1,2-Dimethoxyethane **616-38-6**, Dimethyl carbonate
RL: DEV (Device component use); USES (Uses)
(mixing ratio of **solvents** with high lithium ion solvation nos. in **electrolyte solvent** mixts. for secondary lithium **batteries**)

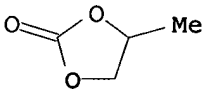
RN 96-48-0 HCAPLUS
CN 2(3H)-Furanone, dihydro- (8CI, 9CI) (CA INDEX NAME)



RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)

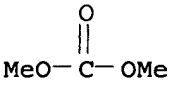


RN 108-32-7 HCAPLUS
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



RN 110-71-4 HCAPLUS
CN Ethane, 1,2-dimethoxy- (8CI, 9CI) (CA INDEX NAME)

RN 616-38-6 HCAPLUS
CN Carbonic acid, dimethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



L70 ANSWER 14 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1998:578902 HCAPLUS
DN 129:318610
TI Study of the reactions of Li with tetrahydrofuran and propylene carbonate by photoemission spectroscopy
AU Zhuang, G. R.; Wang, K.; Chen, Y.; Ross, P. N., Jr.
CS Lawrence Berkeley National Laboratory, University of California, Berkeley, CA, 94720, USA
SO Journal of Vacuum Science & Technology, A: Vacuum, Surfaces, and Films (1998), 16(5), 3041-3045
CODEN: JVTAD6; ISSN: 0734-2101
PB American Institute of Physics
DT Journal
LA English
AB The reactions of Li with **two** organic **solvents** of tech. importance in Li **batteries**, THF and polycarbonate (PC), were studied in ultrahigh vacuum by photoemission spectroscopy. The organic condensate layers were formed by dosing thin (6-10 nm) films of Li at 120-135 K, with the reactions monitored by x-ray photoemission spectroscopy and UV photoemission spectroscopy upon subsequent warming of the sample. Activation of the first layer of THF by Li starts at a temperature as low as 120 K. Polymerization of THF (forming poly-THF) occurs upon melting near 180 K, but is accompanied by chain-terminating reactions that form **lithium** alkoxide(**s**) and hydrocarbon gas(es), such as ethylene and/or propylene. Between 180 and 320 K, there is progressively greater conversion of poly-THF to alkoxide such that at 320 K, the surface film is almost entirely composed of alkoxide. At or near its bulk melting temperature of 220 K, essentially all of the PC remaining on the surface has reacted with Li to form an alkyl carbonate. With increasing temperature, part (25-33%) of the alkyl carbonate decomps. to form an alkoxide. The alkyl groups in the organo-Li compds. derived from PC are most probably propylene. There is no evidence of the formation of any gaseous products containing carbon or oxygen at temps. below 320 K under the conditions of these expts. Of particular relevance to **battery** technol., however, is that in both cases the organo-Li layers that have formed at 270-320 K were formed in the presence of excess unreacted Li, which is the usual circumstance in a real **battery**, and that no evidence was found of inorg. Li carbonate as a product of the reaction with PC.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 72
ST lithium THF propylene carbonate reaction; THF lithium reaction; propylene carbonate lithium reaction
IT Metal alkoxides
RL: FMU (Formation, unclassified); PRP (Properties); FORM (Formation, nonpreparative)
(lithium; photoemission spectroscopy of lithium reaction with THF and propylene carbonate)
IT Solvents
(organic; photoemission spectroscopy of lithium reaction with THF and propylene carbonate)
IT Binding energy
Reaction mechanism
UV photoelectron spectroscopy
X-ray photoelectron spectra
X-ray photoelectron spectroscopy
(photoemission spectroscopy of lithium reaction with THF and propylene carbonate)
IT Alkenes, formation (nonpreparative)
Cycloalkanes
Hydrocarbons, formation (nonpreparative)
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)

(photoemission spectroscopy of lithium reaction with THF and propylene carbonate)

IT 74-85-1, Ethylene, formation (nonpreparative) 115-07-1, Propylene, formation (nonpreparative)
RL: FMU (Formation, unclassified); FORM (Formation, nonpreparative)
(photoemission spectroscopy of lithium reaction with THF and propylene carbonate)

IT 463-79-6D, Carbonic acid, alkyl esters, lithium salt, properties 554-13-2, Lithium carbonate 1344-28-1, Alumina, properties 12057-24-8, Dilithium oxide, properties
RL: PRP (Properties)
(photoemission spectroscopy of lithium reaction with THF and propylene carbonate)

IT 108-32-7, Propylene carbonate 109-99-9, THF, reactions
RL: PRP (Properties); RCT (Reactant); RACT (Reactant or reagent)
(photoemission spectroscopy of lithium reaction with THF and propylene carbonate)

IT 7439-93-2, Lithium, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(photoemission spectroscopy of lithium reaction with THF and propylene carbonate)

RE.CNT 13 THERE ARE 13 CITED REFERENCES AVAILABLE FOR THIS RECORD
ALL CITATIONS AVAILABLE IN THE RE FORMAT

L70 ANSWER 15 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1997:740634 HCAPLUS
DN 127:334136
TI **Electrolytic** solution for lithium cells and method for its production
IN Tsujioka, Shouichi; Takahata, Mituo; Itou, Hisakazu; Kawashima, Tadayuki; Sato, Keiji; Sasaki, Hiromi; Yamamoto, Sunao
PA Central Glass Company, Limited, Japan
SO Can. Pat. Appl., 33 pp.
CODEN: CPXXEB
DT Patent
LA English
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	CA 2193119	AA	19970615	CA 1996-2193119	19961216
	CA 2193119	C	20010130		
	JP 09165210	A2	19970624	JP 1995-325365	19951214
	JP 2987397	B2	19991206		
	JP 09245807	A2	19970919	JP 1996-52816	19960311
	JP 2982950	B2	19991129		
	JP 10092468	A2	19980410	JP 1996-247385	19960919
	JP 3034202	B2	20000417		
PRAI	JP 1995-325365	A	19951214		
	JP 1996-52816	A	19960311		
	JP 1996-247385	A	19960919		

AB A method is disclosed for producing an **electrolytic** solution containing a solute of LiPF6. This method includes a step of (1) reacting LiF with PF5 in a nonaq. organic solvent that is used for producing a **Li** cell's **electrolytic** solution to form the LiPF6 dissolved in the solvent. Both yield and purity of the reaction product are sufficiently high, and the reaction can easily be managed. After the step 1, the nonaq. organic solvent may be replaced with another nonaq. organic solvent. A method is also disclosed for purifying an **electrolytic** solution used for Li cells. The **electrolytic** solution contains an acid impurity having ≥1 H atom in the mol. The method includes

steps of (a) adding ≥1 H-free halide selected from chlorides, bromides and iodides to the **electrolytic** solution so that the acid impurity is reacted with ≥1 H-free halide to form ≥1 hydrogen halide selected from HCl, HBr, and HI; and (b) purging ≥1 hydrogen halide from the **electrolytic** solution to purify the **electrolytic** solution The acid impurity concentration of the **electrolytic** solution is substantially decreased.

IC ICM C01B025-455
ICS H01M006-16; H01M010-26

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)

ST **electrolyte** lithium cell

IT **Battery electrolytes**
(for lithium cells)

IT 7681-11-0, Potassium iodide, uses 10102-68-8, Calcium iodide 10377-58-9, Magnesium iodide
RL: NUU (Other use, unclassified); USES (Uses)
(agent for purification of lithium hexafluorophosphate **electrolyte** for lithium cells)

IT 75-36-5, Acetyl chloride 75-44-5, Phosgene 79-37-8, Oxalyl chloride 7447-40-7, Potassium chloride, uses 7447-41-8, Lithium chloride, uses 7550-35-8, Lithium bromide 7647-14-5, Sodium chloride, uses 7647-15-6, Sodium bromide, uses 7681-82-5, Sodium iodide, uses 7719-12-2, Phosphorus chloride (PCl3) 7758-02-3, Potassium bromide, uses 7786-30-3, Magnesium chloride, uses 7789-41-5, Calcium bromide 7789-48-2, Magnesium bromide 10025-87-3, Phosphoric trichloride 10026-04-7, Silicon chloride (SiCl4) 10026-13-8, Phosphorus chloride (PCl5) 10043-52-4, Calcium chloride, uses 10294-34-5, Boron chloride (BCl3) 10377-51-2, Lithium iodide 12771-08-3, Sulfur chloride 13454-99-4
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(agent for purification of lithium hexafluorophosphate **electrolyte** for lithium cells)

IT 21324-40-3P, Lithium hexafluorophosphate (LiPF6)
RL: IMF (Industrial manufacture); PEP (Physical, engineering or chemical process); PREP (Preparation); PROC (Process)
(**electrolyte** for lithium cells)

IT 14283-07-9P, Lithium tetrafluoroborate (LiBF4)
RL: PUR (Purification or recovery); PREP (Preparation)
(**electrolyte** for lithium cells)

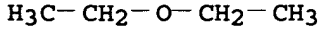
IT 7647-19-0, Phosphorus fluoride (PF5) 7789-24-4, Lithium fluoride, reactions
RL: RCT (Reactant); RACT (Reactant or reagent)
(in preparation of lithium hexafluorophosphate **electrolyte** for lithium cells)

IT **60-29-7**, Diethyl ether, uses **75-05-8**, Acetonitrile, uses **79-20-9**, Methyl acetate **96-49-1**, Ethylene carbonate **105-58-8**, Diethyl carbonate **108-32-7**, Propylene carbonate **110-71-4**, 1,2-Dimethoxyethane **141-78-6**, Ethyl acetate, uses **616-38-6**, Dimethyl carbonate **623-53-0**, Ethylmethyl carbonate
RL: TEM (Technical or engineered material use); USES (Uses)
(**solvent** in preparation of lithium hexafluorophosphate **electrolyte** for lithium cells)

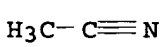
IT **60-29-7**, Diethyl ether, uses **75-05-8**, Acetonitrile, uses **79-20-9**, Methyl acetate **96-49-1**, Ethylene carbonate **105-58-8**, Diethyl carbonate **108-32-7**, Propylene carbonate **110-71-4**, 1,2-Dimethoxyethane **141-78-6**, Ethyl acetate, uses **616-38-6**, Dimethyl carbonate **623-53-0**, Ethylmethyl carbonate

RL: TEM (Technical or engineered material use); USES (Uses)
(**solvent** in preparation of lithium hexafluorophosphate **electrolyte** for lithium cells)

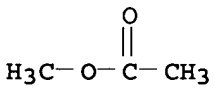
RN 60-29-7 HCAPLUS
CN Ethane, 1,1'-oxybis- (9CI) (CA INDEX NAME)



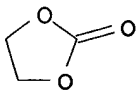
RN 75-05-8 HCAPLUS
CN Acetonitrile (8CI, 9CI) (CA INDEX NAME)



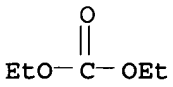
RN 79-20-9 HCAPLUS
CN Acetic acid, methyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



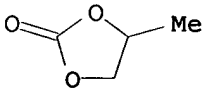
RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



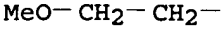
RN 105-58-8 HCAPLUS
CN Carbonic acid, diethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



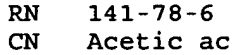
RN 108-32-7 HCAPLUS
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



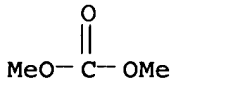
RN 110-71-4 HCAPLUS
CN Ethane, 1,2-dimethoxy- (8CI, 9CI) (CA INDEX NAME)



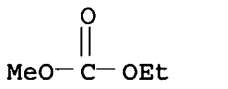
RN 141-78-6 HCAPLUS
CN Acetic acid ethyl ester (8CI, 9CI) (CA INDEX NAME)



RN 616-38-6 HCAPLUS
CN Carbonic acid, dimethyl ester (6CI, 8CI, 9CI) (CA INDEX NAME)



RN 623-53-0 HCAPLUS
CN Carbonic acid, ethyl methyl ester (7CI, 8CI, 9CI) (CA INDEX NAME)



L70 ANSWER 16 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1996:315736 HCAPLUS
DN 125:12208
TI Infrared Spectra and Molecular Relaxation Dynamics of LiSCN in Polyethers: Toward the Polymer-Electrolyte
AU Kreitner, Rebecca; Park, Jessie; Xu, Meizhen; Eyring, Edward M.; Petrucci, Sergio
CS Weber Research Institute, Polytechnic University, Farmingdale, NY, 11735, USA
SO Macromolecules (1996), 29(13), 4722-4727
CODEN: MAMOBX; ISSN: 0024-9297
PB American Chemical Society
DT Journal
LA English
AB IR spectra of the antisym. stretching mode ("CN stretch") of the SCN- anion for LiSCN dissolved in the ethers 1,2-dimethoxyethane (1,2-DME), diglyme, triglyme, and poly(ethylene oxide) di-Me ether of average molar mass 250 (PEO-250) at various concns. at 25 °C reveal that the electrolyte LiSCN is heavily associated to form contact ion pairs LiNCS. A minor amount exists as solvent-separated and/or free ions (**Li+ S**, -NCS or -NCS), the so-called "spectroscopically free" thiocyanate ions. The mol. dynamics of the same electrolyte in the same ethers have been studied by ultrasonic (except for triglyme because of limited solubility of LiSCN) and microwave dielec. relaxation techniques. The ultrasonic relaxation spectra, in the frequency range 1-400 MHz, can be interpreted by the sum of two Debye relaxation processes, which are taken to reflect the multistep Eigen process: Li+Sy + -NCS .dblharw.1 Li+Ox, -NCS .dblharw.2 Li+Ox-1, -NCS .dblharw.3 LiNCS. Here S is a solvent mol., whereas O denotes a binding post of the solvent such as an oxygen atom. The fast observed process is attributed to step 2, coupled to the faster step 1, through a pre-equilibration constant K1. The "slow" observed process is interpreted as due to step 3, coupled with the two faster processes 1 and 2. The interesting finding is that, whereas for 1,2-DME the data follow a sep. trend, the data for diglyme and for PEO-250 appear to have the same

concentration dependence of both the relaxation times τI and τII. Yet, the repetition unit (-CH2CH2O-)n number n is 2 for diglyme and 4.6 for PEO-250. For τII vs cLiSCN, the common concentration dependencies extend to the data in PEO-400. These results are interpreted as meaning that the observed processes, characterized by τI and τII, reflect the local relaxation dynamics of desolvation of ions by interchange of the -CH2CH2O- groups by -NCS, independent of the increase of the chain length of the polyether, within the above range of n values. The UHF-microwave dielec. relaxation spectra of LiSCN in the above **solvent** systems 1, 2-DME, diglyme, and PEO-250 at 25 °C and at a concentration C .simeq. 0.1 mol dm-3, when coupled with the results of the same spectra for triglyme, reveal a correlation between the solute dielec. relaxation time τI(D) and the repetition number n of the (-CH2CH2O-) units of the polyether. This is taken to indicate that the rotational relaxation time of the solute LiNCS dipoles depends on the chain length of the polyether; namely, τI(D) reflects the long-range dynamics of the solvent.

CC 37-5 (Plastics Manufacture and Processing)
Section cross-reference(s): 76

ST dielec relaxation lithium thiocyanate polyethylene glycol; ultrasonic spectroscopy lithium thiocyanate polyethylene glycol; IR spectroscopy lithium thiocyanate polyethylene glycol; ether complexation lithium thiocyanate; dimethoxyethane lithium thiocyanate mol dynamics; diglyme lithium thiocyanate mol dynamics; triglyme lithium thiocyanate mol dynamics; contact ion pair lithium thiocyanate polyether

IT Ethers, properties
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(IR spectra and mol. relaxation dynamics of LiSCN in ethers and polyethers)

IT **Battery** electrolytes
(IR spectra and mol. relaxation dynamics of LiSCN in ethers and polyethers in relation to)

IT Dielectric relaxation
Infrared spectra
(of LiSCN in ethers and polyethers)

IT Ion pairs
(contact, of LiSCN in ethers and polyethers)

IT 110-71-4D, 1,2-Dimethoxyethane, lithium complexes 111-96-6D, Diglyme, lithium complexes 112-49-2D, Triglyme, lithium complexes 24991-55-7D, Poly(ethylene glycol) dimethyl ether, lithium complexes
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(IR spectra and mol. relaxation dynamics of LiSCN in ethers and polyethers)

IT 556-65-0, Lithium thiocyanate
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(model electrolyte; IR spectra and mol. relaxation dynamics of LiSCN in ethers and polyethers)

L70 ANSWER 17 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1994:583576 HCAPLUS
DN 121:183576
TI Manufacture of polymer electrodes for **batteries** and electrochemical devices
IN Tonomura, Tadashi; Uemachi, Yasushi; Myamoto, Yoshiko
PA Matsushita Electric Ind Co Ltd, Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent

LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 06150910	A2	19940531	JP 1992-299585	19921110
PRAI	JP 1992-299585		19921110		

AB The electrodes are prepared by mixing an elec. conductive material with an organic s compound monomers, which forms S-metal (including S-H) bond on the cleavage fo S-S bond on electrochem. reduction and returns to the S-S form on electrochem. oxidation, adding a son. of polyethylenimine to the mixture, and removing the solvent of the solution The conductive material may be a powdered conducting polymer. The manufacture of the electrodes may also include steps of adding a 2nd solution of a polymer to the imine containing mixture and removing the **solvent** of the **2nd** solution **Batteries** using these electrodes have long cycle life.

IC ICM H01M004-04
ICS H01M004-60; H01M010-40

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 37, 38

ST **battery** org sulfur compd polymer electrodes; **lithium battery sulfur** compd polymer cathode

IT Cathodes
(**battery**, organic sulfur compound polymer-polyaniline composites for, manufacture of)

IT Optical imaging devices
(electrochromic, organic sulfur compound polymer-polyaniline composite electrodes for, manufacture of)

IT 25233-30-1 27515-15-7
RL: MOA (Modifier or additive use); USES (Uses)
(electrodes containing organic sulfur compds. and polyethylenimine and, manufacture of, for secondary lithium **batteries** and electrochem. devices)

IT 1072-71-5, 2,5-Dimercapto-1,3,4-thiadiazole
RL: MOA (Modifier or additive use); USES (Uses)
(electrodes containing polyaniline and polyethylenimine and, manufacture of, for secondary lithium **batteries** and electrochem. devices)

IT 25014-41-9, Polyacrylonitrile
RL: MOA (Modifier or additive use); USES (Uses)
(electrodes containing, organic sulfur compds.-polyethylenimine-polyaniline, manufacture of, for secondary lithium **batteries** and electrochem. devices)

L70 ANSWER 18 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1992:654926 HCAPLUS
DN 117:254926
TI Nonaqueous electrolyte solutions and **batteries** thereof
IN Makibe, Yutaka; Taniguchi, Keiji
PA Ricoh Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 04206471	A2	19920728	JP 1990-337243	19901130
	JP 3046972	B2	20000529		
PRAI	JP 1990-337243		19901130		

AB The electrolyte solns. contain ≥1 S-containing organic solvent selected from lower alkylene trithiocarbonate and 4-lower alkyl 1,3-oxathiolane-2-thione. Li/MnO2 **batteries** using these

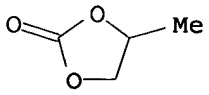
electrolyte solns. have long cycle life.
IC ICM H01M006-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST alkylene trithiocarbonate **battery** electrolyte solvent; lithium manganese **battery** electrolyte solvent; alkyloxathiolanethione **battery** electrolyte solvent; oxathiolanethione **battery** electrolyte solvent; sulfur contg solvent **battery** electrolyte; thiocarbonate **battery** electrolyte solvent
IT **Battery** electrolytes
(**lithium** salt, **sulfur**-containing organic solvents for, for long cycle life)
IT 110-71-4
RL: USES (Uses)
(electrolyte solvents containing organic sulfur compds. and, for secondary lithium/manganese dioxide **batteries**)
IT 822-38-8, Ethylene trithiocarbonate 1748-15-8, 1,3-Dithiane-2-thione 21804-86-4
RL: USES (Uses)
(electrolyte **solvents** containing, for secondary lithium/manganese dioxide **batteries**)
IT 7791-03-9, **Lithium** perchlorate
RL: USES (Uses)
(electrolyte, **sulfur**-containing organic solvents for, in secondary **batteries**)

L70 ANSWER 19 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1991:65904 HCAPLUS
DN 114:65904
TI **Electrolytes** for lithium **batteries**
IN Kitamura, Takashi; Oofuku, Eiji; Kawagoe, Takahiro
PA Bridgestone Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 4 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
FAN.CNT 1

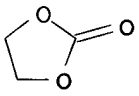
PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 02265171	A2	19901029	JP 1989-87195	19890405
PRAI JP 1989-87195		19890405		

AB The **electrolytes** contain LiPF6 and other **Li** salt(s), and propylene carbonate and ethylene carbonate **solvent**. These **electrolytes** are especially suitable for secondary Li **batteries**. Thus, a maximum charging-discharging efficiency was observed for a test **battery** having LiPF6-LiClO4 (total 1M) in 1:1 (volume) ethylene carbonate-propylene carbonate **electrolyte**.
IC ICM H01M010-26
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST **battery** lithium **electrolyte**
IT **Batteries**, secondary
(lithium, with **electrolytes** containing mixed salts and **solvents**, high-efficiency)
IT **108-32-7**, Propylene carbonate
RL: USES (Uses)
(**electrolytes** containing ethylene carbonate and, for lithium **batteries**)
IT **96-49-1**, Ethylene carbonate
RL: USES (Uses)
(**electrolytes** containing propylene carbonate and, for lithium

batteries)
IT 7791-03-9, Lithium perchlorate 14283-07-9, Lithium tetrafluoroborate
RL: USES (Uses)
(**electrolytes** of **solvent** mixture containing lithium hexafluorophosphate and, for lithium **batteries**)
IT 21324-40-3, Lithium hexafluorophosphate
RL: USES (Uses)
(**electrolytes** of **solvent** mixture containing **lithium** salt(s) and, for **lithium batteries**)
IT **108-32-7**, Propylene carbonate
RL: USES (Uses)
(**electrolytes** containing ethylene carbonate and, for lithium **batteries**)
RN 108-32-7 HCAPLUS
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



IT **96-49-1**, Ethylene carbonate
RL: USES (Uses)
(**electrolytes** containing propylene carbonate and, for lithium **batteries**)
RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



L70 ANSWER 20 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1990:202049 HCAPLUS
DN 112:202049
TI Ambient temperature high-rate lithium/organosulfur **batteries**
AU Visco, S. J.; Liu, M.; De Jonghe, L. C.
CS Mater. Chem. Sci. Div., Lawrence Berkeley Lab., Berkeley, CA, 94720, USA
SO Journal of the Electrochemical Society (1990), 137(4), 1191-2
CODEN: JESOAN; ISSN: 0013-4651
DT Journal
LA English
AB On immersion of Li foil in tetraethylthiuram disulfide (I) solution in different organic **solvents** for **2** mo, a passivation layer formed. Li/graphite-I **batteries** were fabricated using a cathode of I in DMSO. The **batteries** sustained relatively high rates at ambient temperature The projected practical energy d. and power d. of the **battery** were 82 W-h/kg and 140 W-h/kg, resp., at 16 mA/cm2. The Li/I **batteries** performed well during extended cycling tests at ambient temperature The Li foils maintained their integrity for 1.5 yr in several I-solvent solns.; the best results were obtained for Li exposed to I-sulfolane solution In most cases, the presence of SO2 or S2Cl2 improved the inertness of the Li foil to the I solns.
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
ST lithium organosulfur **battery**; passivation lithium ethylthiuram

disulfide **battery**

IT **Batteries**, secondary
(lithium-tetraethylthiuram disulfide, containing organic solvent, performance of)

IT Passivation
(of lithium, in tetraethylthiuram disulfide-organic solvent solution, ambient temperature **battery** use in relation to)

IT 97-77-8, Tetraethylthiuram disulfide
RL: USES (Uses)
(cathodic depolarizer, lithium passivation in organic solvent solution of, **battery** use in relation to)

IT 7446-09-5, Sulfur dioxide, uses and miscellaneous 10025-67-9, **Sulfur** chloride (S2Cl2)
RL: USES (Uses)
(**lithium** passivation in tetraethylthiuram disulfide-organic solvent solution containing, **battery** use in relation to)

IT 7439-93-2, Lithium, uses and miscellaneous
RL: RCT (Reactant); RACT (Reactant or reagent)
(passivation of, in tetraethylthiuram disulfide-organic solvent solution, ambient temperature **battery** use in relation to)

IT 67-68-5, DMSO, uses and miscellaneous 68-12-2, Dmf, uses and miscellaneous 75-05-8, Acetonitrile, uses and miscellaneous 109-99-9, Thf, uses and miscellaneous 111-96-6, Diglyme 126-33-0, Sulfolane 127-19-5, Dimethylacetamide 872-50-4, n-Methylpyrrolidinone, uses and miscellaneous
RL: USES (Uses)
(solvent, tetraethylthiuram disulfide solution in, lithium passivation in, **battery** use in relation to)

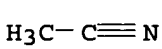
L70 ANSWER 21 OF 21 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1988:495989 HCAPLUS
DN 109:95989
TI **Electrolyte** for **lithium-sulfur** dioxide **battery**
IN Faulkner, Larry R.; Davidson, Isobel J.
PA Amoco Corp., USA
SO U.S., 7 pp.
CODEN: USXXAM
DT Patent
LA English
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 4752541	A	19880621	US 1987-23777	19870309
	AU 8812676	A1	19880908	AU 1988-12676	19880307
	AU 593980	B2	19900222		
	EP 283179	A1	19880921	EP 1988-301950	19880307
	R: AT, BE, CH, DE, ES, FR, GB, IT, LI, LU, NL, SE				
	JP 63236276	A2	19881003	JP 1988-55956	19880309
PRAI	US 1987-23777	A	19870309		

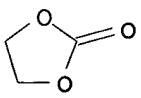
AB The **electrolyte** comprises a solution of .apprx.0.1-6M AlCl3 and ≥1 Li salt (LiAlCl4) in a mixture of .apprx.60-99 weight% SO2 with ≥1 polar organic compound having a donor number .apprx.10-25 and selected from propylene carbonate, ethylene carbonate, MeOC2H4OMe, 1,3-dioxolane, MeCn, and γ-butyrolactone. The resp. molar ratios of AlCl3: equivs. of Li+ and of SO2: AlCl3 are .apprx.0.1-50 and .apprx.2-175. The pos. effects of chemical uncombined AlCl3 in the **electrolyte** of a Li-SO2 **battery** on the discharge capacity of the **battery** as well as on its cycling characteristics were demonstrated.

IC ICM H01M004-36

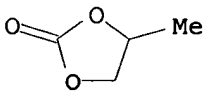
ICS H01M006-14
INCL 429101000
CC 52-2 (**Electrochemical**, Radiational, and Thermal Energy Technology)
ST **lithium sulfur** dioxide **battery** **electrolyte**; aluminum chloride lithium **battery**
IT **Batteries**, secondary
(**lithium-sulfur** dioxide, with **electrolyte** containing organic **solvent** and chemical uncombined aluminum chloride)
IT 7446-70-0, Aluminum chloride, uses and miscellaneous
RL: USES (Uses)
(**electrolyte** containing organic **solvent** and chemical uncombined, for **lithium-sulfur** dioxide **batteries**)
IT **75-05-8**, uses and miscellaneous **96-49-1** **108-32-7** 110-71-4 646-06-0
RL: USES (Uses)
(**electrolyte solvents** containing, for **lithium** **-sulfur** dioxide **batteries**)
IT **96-48-0**
RL: USES (Uses)
(**electrolytes** containing, for **lithium-sulfur** dioxide **batteries**)
IT **75-05-8**, uses and miscellaneous **96-49-1** **108-32-7**
RL: USES (Uses)
(**electrolyte solvents** containing, for **lithium** **-sulfur** dioxide **batteries**)
RN 75-05-8 HCAPLUS
CN Acetonitrile (8CI, 9CI) (CA INDEX NAME)



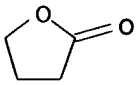
RN 96-49-1 HCAPLUS
CN 1,3-Dioxolan-2-one (9CI) (CA INDEX NAME)



RN 108-32-7 HCAPLUS
CN 1,3-Dioxolan-2-one, 4-methyl- (9CI) (CA INDEX NAME)



IT **96-48-0**
RL: USES (Uses)
(**electrolytes** containing, for **lithium-sulfur** dioxide **batteries**)
RN 96-48-0 HCAPLUS
CN 2(3H)-Furanone, dihydro- (8CI, 9CI) (CA INDEX NAME)



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